

## WINDS.

The most frequent directions of the wind during November, 1883, at the Signal Service stations are shown on chart iii. by arrows flying with the wind. In the upper Mississippi and lower Missouri valleys, lake region, Ohio valley, and on the Atlantic coast north of Virginia, the prevailing winds were from south to southwest; on the south Atlantic and Gulf coasts they were northerly; in the upper Missouri valley they were northwesterly; in Montana westerly; on the Pacific coast variable.

## TOTAL MOVEMENTS OF THE AIR.

[In miles.]

In the following table are given the stations reporting the largest and smallest total movements of the air in each of the various districts:

Districts.	Stations reporting largest.	Miles.	Stations reporting smallest.	Miles.
New England.....	Block Island, R. I.....	12,191	New Haven, Conn.....	5,677
Middle Atlantic states.....	Cape May, N. J.....	13,134	Lynchburg, Va.....	2,556
South Atlantic states.....	Fort Macon, N. C.....	10,123	Augusta, Ga.....	2,376
Florida peninsula.....	Key West.....	8,629	Cedar Keys.....	5,757
East Gulf.....	New Orleans.....	5,974	Montgomery, Ala.....	3,437
West Gulf.....	Indianola, Tex.....	10,359	Little Rock, Ark.....	3,679
Ohio valley.....	Louisville, Ky.....	6,123	Indianapolis, Ind.....	4,277
Tennessee.....	Nashville.....	4,703	Chattanooga.....	4,006
Lower lakes.....	Sandusky, Ohio.....	11,388	Toledo, Ohio.....	7,789
Upper lakes.....	Grand Haven, Mich.....	21,776	Duluth, Minn.....	6,116
Extreme northwest.....	Moorhead, Minn.....	8,021	Bismarck, Dak.....	6,171
Upper Mississippi valley.....	Saint Louis, Mo.....	9,459	Dubuque, Ia.....	4,646
Missouri valley.....	Huron, Dak.....	7,329	Fort Bennett, Dak.....	4,325
Northern slope.....	Fort Maginnis, Mont.....	9,944	Helena, Mont.....	3,311
Middle slope.....	Fort Elliott, Texas.....	7,420	West Las Animas, Colo.....	4,507
Southern slope.....	Fort Concho, Tex.....	6,198	Fort Stockton, Tex.....	2,825
Southern plateau.....	Fort Grant, Ariz.....	4,859	El Paso, Tex.....	2,736
Northern plateau.....	Dayton, Wash.....	5,789	Lewiston, Idaho.....	2,089
North Pacific.....	Fort Canby, Wash.....	8,659	Roseburg, Oreg.....	1,489
Middle Pacific.....	San Francisco, Cal.....	4,459	Sacramento, Cal.....	3,126
South Pacific.....	Los Angeles, Cal.....	3,986	San Diego, Cal.....	3,526

On the summits of Mount Washington, New Hampshire, and Pike's Peak, Colorado, the total movements were 25,950 and 17,062 miles, respectively, the record at the former station being incorrect on account of frost-work on the recording instrument. At Salt Lake City, Utah, the only Signal Service station in the Middle plateau, the total movement of the air was 3,165 miles.

## HIGH WINDS.

On the summit of Mount Washington, New Hampshire, velocities of fifty miles or more per hour occurred on the following dates: 3d to 7th, 9th, 10th, 11th, 13th, 14th, 16th, 17th, 18th, 20th to 30th. The highest velocities recorded were: 100, nw., 12th; 100, w., 22d and 100, se., 26th (maximum for month); 90, nw., 17th; 84, nw., 27th; 80, nw., 9th, 10th, 13th and 28th.

On the summit of Pike's Peak, Colorado, velocities of fifty miles or more per hour occurred on the 6th, 7th, 8th, 17th to 26th. The highest velocities recorded were: 84, w., 24th and 81, w., 25th.

Other stations reporting wind-velocities of fifty miles or more per hour are as follows:

Cape May, New Jersey, 72, w., 12th; 52, sw., 14th, 15th, 16th.

Sandy Hook, New Jersey, 68, nw., 12th.

\* Kitty Hawk, North Carolina, 63, ne., 27th.

Barnegat City, New Jersey, 60, nw., 12th.

Fort Canby, Washington Territory, 60, s., 26th.

Rochester, New York, 55, s., 26th.

Sandusky, Ohio, 55, nw., 11th.

Delaware Breakwater, Delaware, 54, nw., 12th.

Block Island, Rhode Island, 54, nw., 12th.

Saint Louis, Missouri, 53, s., 5th.

Buffalo, New York, 53, w., 11th, 12th, 13th; 52, sw., 14th.

Grand Haven, Michigan, 52, w., 11th.

Fort Macon, North Carolina, 52, n., 27th.

Milwaukee, Wisconsin, 51, nw., 11th.

Fort Assiniboine, Montana, 50, sw., 6th.

\* Highest velocity recorded; self-register out of order.

## LOCAL STORMS.

Springfield, Missouri.—On the afternoon of the 5th a very violent and destructive tornado passed over Green county in a direction from west-southwest to east-northeast. It first appeared in the vicinity of the village of Republic (about twelve miles southwest of this city) its path being about one mile north of that place. Many dwellings and other buildings were destroyed in this vicinity, and several persons were seriously injured. At Brookline station, about eight miles southwest of Springfield, numerous dwellings were destroyed, one person was killed and several were injured. A school-house, about three miles west of Springfield, was totally destroyed. The tornado struck Springfield at a few minutes after 2 p. m., and passed in an easterly direction between North Springfield and the former place. Many substantial buildings were destroyed in its path. In Springfield and vicinity six persons were killed and about thirty were more or less seriously injured. At Bridgetown, just east of North Springfield, about thirty small houses were demolished and several persons were injured. The path of the tornado increased from one hundred yards in width at Springfield to about three hundred yards at Bridgetown. Estimates of the value of the property destroyed by this storm vary from \$150,000 to \$200,000.

Buffalo, New York.—During a gale on the afternoon of the 9th a building in course of construction at this place was blown down, killing four workmen and injuring several others.

Hector, Schuyler county, New York.—A tornado occurred in this county on the afternoon of the 9th. It began its course near Reading and passed eastward for a distance of fifteen miles, its path varying in width from eight to twelve rods. Numerous farm buildings were wrecked, trees uprooted and fencing blown down.

Washington, Saint Landry parish, Louisiana.—A whirlwind struck Oakland plantation, about one mile from this place, on the night of 10–11th, which blew down several houses.

Oswego, New York.—At 11.30 p. m. of the 11th a tornado occurred about one and one-half miles north of Cleveland, Oswego county. Several buildings were unroofed and many trees were blown down. The tornado was of very short duration, and was attended during its passage by a loud roaring sound.

Portland, Maine.—The storm of the 13th was very destructive in Piscataquis county. North of Williamsburg and on the west branch of the Piscataquis river, many acres of timber were blown down. The damage to timber in the vicinity of the Katahdin Iron Works is estimated at \$50,000. Reports from northern Penobscot and southern Aroostock counties state that a large amount of damage was done to the timber lands in those sections.

Orono, Penobscot county, Maine.—The storm of the 12th caused great damage to the forests in the northern part of this state.

Batesville, Independence county, Arkansas.—On the 21st a tornado nearly destroyed the village of La Crosse, Izard county, where three persons were killed and several injured. The tornado lasted but a few minutes, coming from the southwest and passing into Oregon county, Missouri. The damage resulting from this storm is estimated at \$100,000.

Vincennes, Knox county, Indiana.—A violent storm occurred at this place on the 21st, which blew down about twenty-five out-buildings in the suburbs of the city. Very heavy rain accompanied the storm. Cellars were suddenly flooded by the gorging of the creek at the railroad trestle north of the town. The path of the storm was only about fifty feet in width. Four miles east of this place a number of buildings were blown down.

Cairo, Illinois.—Trains were delayed on the Saint Louis, Iron Mountain and Southern railroad, owing to wash-outs and other damage caused by the storm of the 21st. At about 7 a. m. a tornado passed within one mile of Bertrand, Mississippi county, Missouri, destroying several dwellings and causing loss of life. Jeffersonville, Clark county, Indiana.—On the night of

the 21st a violent southwesterly storm passed over this city and vicinity, blowing down buildings, trees, signs, &c. This storm was accompanied by unusually heavy rainfall.

North Vernon, Jennings county, Indiana.—Between 7 and 8 p. m. of the 21st, a destructive storm visited this place, which caused considerable loss of property. It passed in a north-easterly direction through the western part of this county, destroying nearly everything in its path. Several residences and barns were destroyed and other property damaged.

Fort Smith, Arkansas.—At 11.30 a. m., of the 21st, a destructive storm swept over this station. The wind, for five minutes, blew at the rate of fifty miles per hour, and caused considerable damage in this vicinity. Several buildings were damaged, and many trees and much fencing were blown down.

Louisville, Kentucky.—A severe storm occurred here on the morning of the 21st. The wind reached a velocity of thirty-six miles per hour, blowing down a number of trees, chimneys, and signs.

Shreveport, Louisiana.—A very heavy rain-storm, lasting about two hours and accompanied by some hail, occurred here on the afternoon of the 21st. The streets were filled with water and many stores in the lower part of the city were submerged. During the storm it was almost as dark as night.

Natchitoches, Natchitoches parish, Louisiana.—A violent storm struck this parish near Cloutierville on the night of the 21st. A large amount of lint and seed cotton was lost and other damage caused.

Carmi, White county, Illinois.—A tornado visited the village of Sacramento, in this county, on the 22d, destroying several buildings. This is the second tornado that has occurred here within the last sixteen months, and about thirteen years ago the village was entirely destroyed.

Prairie du Chien, Crawford county, Wisconsin.—At 9 p. m. of the 25th, a tornado passed over this county in a direction from southwest to northeast. It first struck this county at Bridgeport, where several buildings were destroyed and one person was killed. Everything in the path of the tornado was destroyed; trees two feet in diameter were twisted off. The noise of the tornado was plainly heard at this place.

Portsmouth, North Carolina.—A violent northwesterly storm occurred here at 4.30 a. m. of the 27th, the wind reaching an estimated velocity of seventy miles per hour. Much damage was done to the coast telegraph line.

Kitty Hawk, North Carolina.—On the 29th the schooner "Annie Carll" was blown ashore on Nag's Head beach, eight miles south of this place.

## NAVIGATION.

### STAGE OF WATER IN RIVERS.

The water in the Mississippi river averaged considerably higher than for October. The changes in the upper Mississippi were very slight, but between New Orleans, Louisiana, and Cairo, Illinois, the highest points reached ranged from three feet and three inches, higher, at the former station, to sixteen feet and eight inches, higher, at the latter, where, on the 30th, when at its highest state, it was about twelve feet below the danger-line. At Saint Louis, Missouri, and Davenport, Iowa, the highest stages occurred on the 11th; at Keokuk, Iowa, from the 7th to 12th; at La Crosse, Wisconsin, on the 19th; at Saint Paul, Minnesota, Dubuque, Iowa, and at stations below Cairo, Illinois, the highest stages occurred at, or near, the close of the month. At Saint Paul, Minnesota, river observations were interrupted by ice from the 15th to 23d, and from the 28th to 30th.

The Ohio and Missouri rivers continued low during November, the former reaching a slightly higher point than during October; and the latter averaging slightly lower. At Yankton, Dakota, the Missouri river was frozen on the 15th and 16th.

Navigation in the Tennessee river, which had been suspended on account of low water since July 1st, was resumed

November 23d; the river having risen about four feet on that date. The highest stage occurred on the 25th, when it was ten feet and eleven inches above low water-mark, and four feet and ten inches higher than the highest point reached during October.

The greatest range in any of the rivers occurred in the Mississippi, between Vicksburg and Cairo, where it varied from twelve feet and three inches at the former station, to fourteen feet and nine inches at the latter.

In the following table are shown the danger points at various river stations; the highest and lowest stages for November, 1883, with the dates of occurrence; and the monthly ranges:

Heights of rivers above low-water mark, November, 1883.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River:</i>						
Shreveport, Louisiana.....	29 9					
<i>Arkansas:</i>						
Little Rock, Arkansas.....	30 0	24	10 6	22	4 11	5 7
Fort Smith, Arkansas.....	20	20	2 0	1	1 8	0 12
<i>Missouri:</i>						
Yankton, Dakota.....	20 0	17	3 7	29, 30	0 9	2 10
Omaha, Nebraska.....	16 0	1 10	5 2	30	3 6	2 2
Leavenworth, Kansas.....	21 0	1	7 6	30	5 2	2 4
<i>Mississippi:</i>						
Saint Paul, Minnesota †.....	14 6	27	3 1	11	1 11	1 2
La Crosse, Wisconsin.....	18 0	19	4 4	30	1 0	3 4
Dubuque, Iowa.....	21 10	27	5 0	20	2 8	2 4
Davenport, Iowa.....	15 0	11	4 2	19	1 11	2 3
Keokuk, Iowa.....	14 6	7, 12	5 1	20, 21	2 8	2 3
Saint Louis, Missouri.....	30 0	11	14 6	6, 7, 21	10 1	4 5
Cairo, Illinois.....	40 0	30	28 2	1	13 5	14 9
Memphis, Tennessee.....	31 0	30	20 7	1	7 2	13 5
Vicksburg, Mississippi.....	41 0	23, 30	23 1	3, 4	10 10	12 3
New Orleans, Louisiana †.....	2 0	27	8 11	4	13 0	4 1
<i>Ohio:</i>						
Pittsburg, Pennsylvania.....	20 0	1	8 1	21	3 10	5 1
Cincinnati, Ohio.....	50 0	23	20 8	9	11 11	8 9
Louisville, Kentucky.....	24 0	23	10 3	10	6 7	3 8
<i>Chamberland:</i>						
Nashville, Tennessee.....	42 0	28	16 8	8	4 7	12 1
<i>Tennessee:</i>						
Chattanooga, Tennessee.....	33 0	25	10 11	10	1 4	9 7
<i>Monongahela:</i>						
Pittsburg, Pennsylvania.....	29 0	1	8 1	21	3 0	5 1
<i>Savannah:</i>						
Augusta, Georgia.....		26	13 4	18, 19	4 5	8 11
<i>Willamette:</i>						
Portland, Oregon.....		28	8 8	10	0 10	7 10
<i>Sacramento:</i>						
Red Bluff, California.....		9	1 6	3	0 9	0 0
Sacramento, California.....		11	7 11	23	7 3	0 8
<i>Mobile:</i>						
Mobile, Alabama.....		21	16 9	16	12 8	4 1
<i>Colorado:</i>						
Yuma, Arizona.....						

\* Frozen 15th and 16th. † Below high-water marks of 1874 and 1883. ‡ Observations interrupted by ice: see text.

## CLOSING OF NAVIGATION.

Duluth, Minnesota.—Navigation for this season was practically closed on the 30th.

Moorhead, Minnesota.—Navigation in the Red river at this place was closed on the 15th.

Fort Totten, Dakota.—Navigation on Devil's lake closed on the 11th.

Dubuque, Iowa.—All boats at this place went into winter quarters on the 23d.

Saint Paul, Minnesota.—The last boat of the season left this place for Saint Louis, Missouri, on the 11th.

Fort Sully, Dakota.—Navigation in the Missouri river at this place was closed on the 26th.

Fort Benton Montana.—The Missouri river was closed to navigation here on the 25th.

Menand station (near Albany), New York.—The Erie canal was closed to navigation on the 30th.

The following data relating to the Hudson river at Albany, New York, are taken from "The Argus" of December 3, 1883:

The winter of 1873-4 was an exceptionally warm one, during which the river was closed but thirty-one days, and it is stated that navigation might have been kept up throughout the entire winter. The succeeding winter (1874-5) was a very severe one, the river being closed one hundred and twenty days, which is the longest period that it has remained closed at any time since the winter of 1823-4. The winter of 1835-6 was also one of great